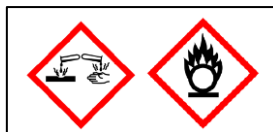


Safety Module

Safety Topic: Piranha Cleaning Solution

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- **Purpose** – Piranha (piranha etch) is an acidic and oxidizing solution used to remove organic material from glassware. Piranha is particularly useful when cleaning fritted glassware. The traditional piranha solution is a 3:1 (v:v) mixture of sulfuric acid and 30% aqueous hydrogen peroxide. Piranha may result in an explosion if not handled with extreme caution.
- **Equipment** – Sulfuric acid, 30% aqueous hydrogen peroxide, glass Erlenmeyer flask, glass waste container, glass graduated cylinder, thick butyl gloves
- **Process** – Piranha must be made and used exclusively in a fume hood. Remove all other compounds from the immediate area. Work behind the hood sash/panel. Slowly add 1 portion of hydrogen peroxide to the 3 portions of sulfuric acid with stirring to keep the concentration of peroxide low. The solution may become hot. Carefully add the solution to pre-washed and dried glassware to be cleaned. Let sit overnight in the back of a hood away from other materials.
- **Specific considerations** –
 - Do not use plastic containers as they will react with the solution.
 - Piranha generates O₂(g) which can lead to a fire or explosion.
 - Prepare the solution immediately prior to using. Never store piranha and do not put piranha in a closed container or it will explode.
 - Mixing hot piranha with organic compounds such as acetone, isopropanol, nylon or photoresist and may cause an explosion.
 - Neutralize small spills with sodium bicarbonate. A larger spill or a spill outside a fume hood requires EHS assistance for cleanup.
 - Skin or eye exposure to piranha can cause severe burns. The vapor is highly corrosive to mucosal membranes and lungs.
- **Waste handling** – Allow the solution to cool to room temperature and stop generating gasses (~12 hours) before transferring into a clean and dry waste container for disposal. Label the waste as hydrogen peroxide and sulfuric acid.
- **For more information see** –
 - NOCHROMIX® is a safer and more stable cleaning solution alternative (inorganic persulfate solid to be mixed with sulfuric acid) - detailed information on handling and SDS: <http://godax.com/msds-directions-for-use>
 - Piranha SOP <https://ehs.yale.edu/sites/default/files/files/piranha-sop.pdf>
 - Acid Piranha guidelines <https://www.safety.admin.cam.ac.uk/files/hsd176c.pdf>